

AMENDMENTS TO THE CLAIMS:

Claim 1. (Original) A differential limiting control apparatus for a four wheel drive vehicle having clutch means for variably transmitting a driving force to a front drive shaft and to a rear drive shaft, comprising:

automatic clutch control means for automatically calculating and establishing an engagement force of said clutch means according to traveling conditions of said vehicle;

manual clutch control means for manually establishing said engagement force of said clutch means; and

control selecting means for selecting either of said automatic clutch control means and said manual clutch control means and for commanding said selected one to output said engagement force.

Claim 2. (Currently amended) The differential limiting control apparatus according to claim 1, wherein, in an initial condition of an ignition switch turned on, said control selecting means commands ~~command~~ said automatic clutch control means to output said engagement force of said clutch means until said manual clutch control means is newly selected.

Claim 3. (Currently amended) The differential limiting control apparatus according to claim 1, wherein, when said vehicle travels at a higher speed than a threshold value, said control selecting means commands ~~command~~ said automatic clutch control means to output said engagement force of said clutch means.

Claim 4. (Currently amended) The differential limiting control apparatus according to claim 1, wherein said automatic clutch control means includes ~~include~~ target differential rotation speed establishing means for establishing a target differential rotation speed between said front and rear drive shafts, actual differential rotation speed detecting means for detecting an actual differential rotation speed between said front and rear drive shafts, and clutch torque calculating and establishing means for obtaining deviations between said target differential rotation speed and said actual differential rotation speed and for calculating and establishing said engagement force of said clutch means by constituting a switching function using the polarity of an integral term of said deviations and by applying the sliding mode control.

Claim 5. (New) A differential limiting controller for a four wheel drive vehicle having a clutch that variably transmits a driving force to a front drive shaft and to a rear drive shaft, comprising:

an automatic clutch controller that calculates an engagement force of said clutch;

a manual clutch controller for manually controlling said engagement force of said clutch;

and

a controller selector that selects one of said automatic clutch controller and said manual clutch controller.

Claim 6. (New) The controller of claim 5, wherein said automatic clutch controller further establishes an engagement force of said clutch.

Claim 7. (New) The controller of claim 6, wherein said automatic clutch controller establishes an engagement force of said clutch based upon said calculation of said engagement force.

Claim 8. (New) The controller of claim 5, wherein said automatic clutch controller calculates said engagement force based upon traveling conditions of said vehicle.

Claim 9. (New) The controller of claim 5, wherein said controller selects said automatic clutch controller in an initial condition of an ignition switch being turned on.

Claim 10. (New) The controller of claim 9, further comprising a mode switch that indicates an operator preference of manual engagement of said clutch.

Claim 11. (New) The controller of claim 10, wherein said controller selects said manual clutch controller when said mode switch indicates an operator preference for manual engagement of said clutch.

Claim 12. (New) The controller of claim 5, wherein said controller selects said automatic clutch controller when the traveling speed of said vehicle exceeds a threshold speed.

Claim 13. (New) The controller of claim 5, wherein said automatic clutch controller

comprises a target differential rotation speed calculator that calculates a target differential rotation speed between said front drive shaft and said rear drive shaft.

Claim 14. (New) The controller of claim 5, wherein said automatic clutch controller comprises an actual differential rotation speed detector that detects an actual differential rotation speed between said front and rear drive shafts.

Claim 15. (New) The controller of claim 5, wherein said automatic clutch controller comprises a clutch torque calculator that calculates a clutch torque command.

Claim 16. (New) The controller of claim 15, wherein said automatic clutch controller further comprises:

a target differential rotation speed calculator that calculates a target differential rotation speed between said front drive shaft and said rear drive shaft; and

an actual differential rotation speed detector that detects an actual differential rotation speed between said front and rear drive shafts,

wherein said automatic clutch controller calculates said clutch torque command based upon deviations of said calculated target differential rotation speed and deviations of said detected actual differential rotation speed.

Claim 17. (New) The controller of claim 16, wherein said automatic clutch controller

calculates said clutch torque command based upon a sliding mode control of said deviations of said calculated target differential rotation speed and deviations of said detected actual differential rotation speed.

Claim 18. (New) A differential limiting controller for a four wheel drive vehicle having a clutch that variably transmits a driving force to a front drive shaft and to a rear drive shaft, comprising:

an automatic clutch controller that automatically controls an engagement force of said clutch;

a manual clutch controller for manually controlling said engagement force of said clutch; and

a controller selector that selects one of said automatic clutch controller and said manual clutch controller.

Claim 19. (New) The controller of claim 18, wherein said controller selects said automatic clutch controller in an initial condition of an ignition switch being turned on.

Claim 20. (New) The controller of claim 18, wherein said controller selects said automatic clutch controller when the traveling speed of said vehicle exceeds a threshold speed.